The Slim Jim revisited

Bill Sinclair VK2ZCV

The Slim Jim antenna was developed by Fred Judd (SK) and the details first published in *Practical Wireless* and, subsequently, in *Out of Thin Air* and *More Out of Thin Air*. The name comes from its slender construction and the use of the "J" type Integrated Matching stub (JIM) that feeds the base. The antenna is basically an end fed, vertically operated, folded dipole and has been duplicated in various forms, and for different frequencies, throughout the world.

The version to be described came about after some discussions on our local Wednesday night net. It is an ideal and relatively cheap (approx $20 at 18 December 2005) antenna to build using only hand tools. All parts are available locally and none are specialised. See Photo 1 for the complete antenna.

From information gleaned from various sources the following deductions were made. The original design frequency was 145 MHz, so this version has been scaled to 146.5 MHz.

It is advisable to feed the antenna with a balanced feed, therefore a "choke" balun has been incorporated (the cheapest effective method to achieve balance - see Photo 3).

Some form of tuning the antenna to resonance will give some latitude in construction errors. The method used here is taken from Fred Judd's Ultra Slim Jim and consists of a simple capacitor at the high impedance points. It consists of a strip of single-sided fibreglass printed circuit board with the copper side out (see Photo 2).

A more accurate method of locating the correct feed point without multiple holes, or a slot cut in the elements was deemed necessary. This was achieved after assembly of all except the feed point holes in the bar. It was done by sliding the feed point insulator, with feed coax attached and in contact with the bar, up or down to obtain the match (100 mm. in this case). Holes were then drilled in the bar.

Construction should be evident from the photos except for the dimensions. Lay the flat bar on your working surface and, from one end, which will be the top of the "J", mark the first bend centre at 487mm and the second bend centre at 1990 mm.

NOTE that both measurements are from the same starting point.

The two bends may be made by clamping a piece of pipe approximately 40 mm in diameter vertically in a vice, laying the bar horizontally on the vice top, and clamping the bar to the pipe with vice grips or "G" clamp, then pulling both ends around the pipe. If all has gone to plan there should be a gap of 15 mm between the free adjacent ends.

From the longer of these ends cut off 10 mm to make a gap of 25 mm. Measure 490 mm along the longer side from the gap and mount the 43 mm x 12 mm x 12 mm piece of cutting board, which acts as a stiffener at a low impedance point. Notch the 25 mm x 50 mm x 12 mm cutting board approximately 6 mm or enough that the piece of PCB material when mounted will clear the mounting screws and attach at the gap. The PCB may also be mounted to the centre of this insulator at this time.

Clamp the two 50 mm x 45 mm x 12 mm pieces of board together and align carefully. Along the 50 mm side, at 25 mm and in 20 mm, drill a 20 mm hole that is a sliding fit on the

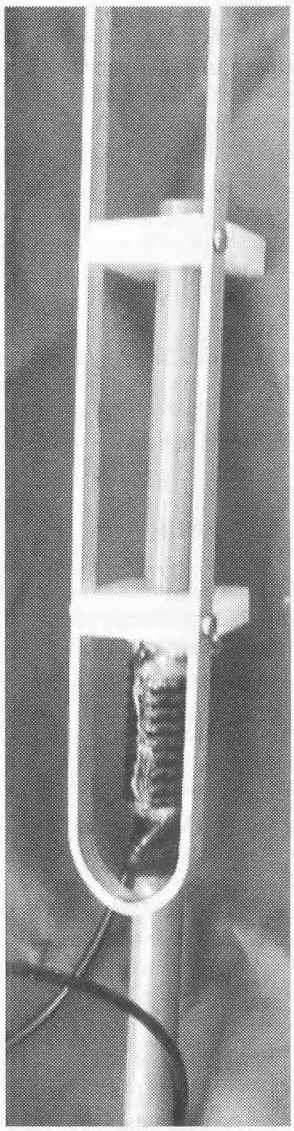

Photo 1 - Feed point and choke balun.

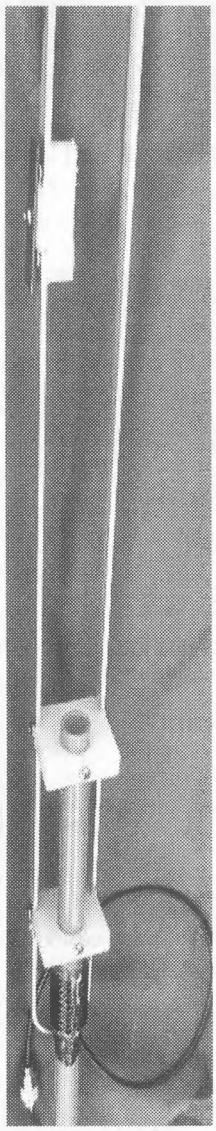

Photo 2 - Tuning and feed point.

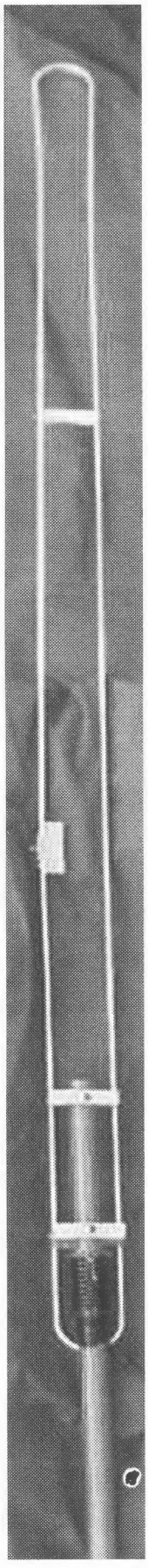

Photo 3 - Complete antenna

conduit. On the opposite face notch each side 3 mm as seen in Photos 2 and 3.

Assemble the coax plug on to the coax and prepare the ends for solder lugs. At 170 mm from one end of the piece of conduit, wind and secure 10 turns of the coax (refer Photos 2 and 3). Slide both pieces of prepared cutting board on to the conduit and attach, with self-tapping screws, the TOP piece ONLY at 20 mm from the top of the conduit and 235 mm from the inside of the bottom of the "J".

Using tails as short as possible attach, with solder lugs and self-tapping screws, the coax to remaining block so that the heads of the screws can make contact with the "J" at about 100 mm from the bottom. Adjust the position of the tuning PCB and this block for best match. Attach the coax permanently after drilling holes in the aluminium at this point. Seal all the connections and secure the blocks to the conduit.

The antenna is now complete. For best operation, mount outside as high as possible, and in the clear, using low loss coax. It may be coated with TECTAL 151 for weather and UV protection. The 2:1 VSWR points of the prototype occur 15 MHz apart.

Parts list

3 m 12 mm x 3 mm aluminium bar.

11 S/Steel self-tapping screws, pan 8G x 12 mm.

600 mm x 20 mm PVC conduit.

2 of 50 mm x 45 mm x 12 mm kitchen cutting board.

1 of 43 mm x 12 mm x 12 mm kitchen cutting board.

1 of 25 mm x 50 mm x 12 mm kitchen cutting board.

1 wavelength coax @ 2 m = 1354 mm + 60 mm for tails.

1 of 12 mm x 60 mm piece single sided fibreglass PCB.

1 of coax plug or socket to suit your gear.

2 of solder lugs with 4 mm hole.

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6 metre propagation *continued*

has questions on the maps and their interpretation.

As a double blind, observations of many days when no fronts were showing were studied and on none of these days did anything but brief meteor or aircraft enhancement occur. Sporadic E never came to the rescue to save the day. This phenomenon goes on in winter as well, and contacts or strong ZL TV signals have been observed every month of the last winter.

The text file is too big for this brief introduction, and there are many weather analysis and cloud maps available to anyone sending an email to the above address. If there is enough interest, I will write another article with maps and comments.

A version of this article has been previously published as "6 metre propagation and weather patterns" Break-In, *p17, Jan/Feb 2006.*

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